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ABSTRACT

The purpose of this study was to compare the ability to pronounce synthetic words of children who learned to read by methods emphasizing early, intensive phonics instruction with the ability of children who learned to read by methods utilizing delayed and less intensive phonics instruction. The sample was selected from among second, third, and fourth graders in each of two school systems. Within school systems, ten boys and ten girls were randomly selected from each of the three grade levels. Children selected from one school system had learned to read by a program with early, intensive phonics instruction. The children selected from the other school system had learned to read by a program with delayed, less intense phonics instruction. Forty synthetic word test items were selected or constructed to illustrate ten selected phonic generalizations. The subjects' task was to pronounce each word as if it were a real word. The subjects were also presented with four synthetic words and asked to state the phonic generalization and whether the spelling pattern helped in pronounciation. The study concluded that ability to pronounce synthetic words increases with grade level, and that early intensive phonics instruction equips the child to become an independent reader at an early age. (WR)

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Early, Intensive Phonics Instruction and the Ability of Second-, Third-, and Fourth-Grade Children to Pronounce Synthetic Words

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Educators and the lay public alike have long debated the emphasis which should be given phonics instruction as well as the time at which phonics instruction should begin. Early studies in the area attended to the issue of phonics versus no phonics. However, as Chall (1967) pointed out, "after the 1930's, people were asking how much and what kind of phonics to teach, rather than whether to teach it." (p. 105) Today, all published reading programs are providing instruction in phonics or code-breaking, but the intensity of this instruction and the point in the program at which it is introduced vary considerably. Little is known about the relative influence of early, intensive phonics and delayed, gradual phonics in helping young readers to develop independence in word attack skills. The present study was a step toward obtaining information relevant to that problem.

Related Research

Many of those involved in studying the problems of teaching young children to read have stressed the importance of mastering letter-sound correspondences as a necessary step in learning to read. Gibson (1965), for example, suggested that decoding letters into sounds is an important phase in becoming a proficient reader and, although it is possible to learn to read without letter-sound correspondences, the "...transfer to new words depends on use of these whatever the method of original training." (p. 1069) Johnson (1970) has likewise suggested that "whatever method of reading instruction is used with the beginning reader...he must sooner or later be taught--or discover for himself--the code." (p. 5) If one accepts the premise that children must master the code as a necessary antecedent to independence in reading, questions arise regarding how and when phonics or code-breaking should be taught.

There is a preponderance of standardized reading achievement test data which compares the relative performance of children who learned to read by methods of instruction which differ in their intensity of phonics instruction. Chall (1967) examined much of this research in investigating the question of whether or not children learn to read better with beginning methods which emphasize meaning or with methods which emphasize code-breaking. After reviewing the literature pertinent to this question, Chall concluded that the first step in learning to read is learning the printed code and that early stress on code-breaking "...not only produces better word recognition and spelling, but also makes it easier for the child to read with understanding." (p. 83)

Relative to this same question, Dykstra (1968) examined the data provided by the Cooperative Research Program in First-Grade Instruction and found support for Chall's conclusions.

> Data from the Cooperative Research Program in First-Grade Instruction tend to support Chall's conclusion that code-emphasis programs produce better over-all primary grade reading and spelling achievement than meaning-emphasis programs. This superiority is especially marked with respect to pronouncing words orally in isolation, spelling words from dictation, and identifying words in isolation on a silent reading test. It is apparent that concentrated teaching of the alphabetic code is associated with improved initial ability to encode and decode words. (p. 21)

The data considered in the studies cited above consisted of the performance of children on standardized reading achievement tests. While this typical means of assessing reading achievement is useful for many purposes, it is not particularly useful for evaluating word attack skills because of its failure to control the effects of sight vocabulary. In a typical standardized group test of word recognition ability, there is no way of knowing whether a child uses his word attack skills to unlock a word or whether the word in question is already part of his sight vocabulary. As Chall (1967) has suggested, a standardized group test of word recognition measures "...an indeterminate

amount of word comprehension, word recognition, and the ability to sound out words not seen before." (p. 104) One way of limiting the task to "sounding out" new words is to use English-like, synthetic words as a testing device. This technique has been used by other researchers (Calfee, et.al., 1969; Chapman, et.al., 1970) in studying the extent to which readers--elementary through college levels--had mastered selected letter-sound correspondences and was also employed in this investigation.

The Purpose of the Study

The purpose of this study was to investigate the extent to which second-, third-, and fourth-grade children who learned to read by methods differing in the intensity of phonics instruction could pronounce synthetic words which conformed to selected phonic generalizations. More specifically, the study was designed to compare the ability to pronounce synthetic words of children who learned to read by methods emphasizing early, intensive phonics instruction with that of children who learned to read by methods utilizing delayed and less intensive phonics instruction. A secondary purpose of this investigation was to determine the extent to which children were able to verbalize appropriate phonic generalizations.

Procedure

The Sample

The sample was selected from among second-, third-, and fourth-grade children in each of two school systems. Within school systems, 10 boys and 10 girls were randomly selected from each of the three grade levels. Children selected from one school system had learned to read by the Lippincott (L) method (McCracken and Walcutt, 1963), a program characterized by early and

intensive phonics instruction. The children selected from the other school system had learned to read by the Scott-Foresman (SF) method (Robinson, et.al., 1965), a program with a delayed and less intense emphasis on phonics instruction. Geographically, the two systems were adjacent and consisted of children from similar white, middle-class backgrounds.

Existing school-administered reading readiness and reading achievement test data were obtained for each child in the sample in order to estimate the groups' equivalence in reading achievement. The Metropolitan Reading Readiness Test had been administered to all children in the sample during the Fall of their first-grade year. In both groups, achievement test data were available from the Spring of the preceding school year. The Metropolitan Achievement Test had been administered to children in the SF group and the Stanford Achievement Test had been administered to children in the L group. In addition, a sight word test devised by the authors was administered to each child in the sample to evaluate further the extent to which the groups could be considered equivalent in terms of reading achievement.

Comparisons were made between groups at each of the three grade levels. Results indicated no significant differences on the sight word test at any of the three grade levels and no significant differences on the readiness test at the third-and fourth-grade levels. Second-grade children in the L group were found to have scored significantly higher ($p < .01$) than children in the SF group on the readiness measure. Since different achievement tests had been administered to the two groups, no direct comparisons were made using these data. However, the average reading achievement of the groups was found to be at or above expected grade level relative to the respective norm groups.

The Measuring Instrument

A synthetic word pronunciation test was constructed for use in this investigation. Individual synthetic word test items were selected from among those used by previous researchers (Calfee, et.al., 1969; Chapman, et.al., 1970) or were devised by the authors. A total of forty synthetic word test items were selected or constructed to illustrate ten selected phonic generalizations--four words representing each of the ten generalizations. The ten phonic generalizations used in constructing the synthetic word pronunciation test were selected on the basis of (1) utility as identified by previous researchers (Oaks, 1952; Burrows and Lourie, 1963; Clymer, 1963; Fry, 1964; Emans, 1967a, 1967b; Burmeister, 1968a, 1968b, 1968c, 1971; Bailey, 1969; Spache and Spache, 1969; and Berdiansky, et.al., 1969) and (2) inclusion in the two instructional programs used in this investigation. It should be noted that although the utility of the vowel-consonant-silent e generalization was found to be of questionable utility, it was included in this investigation because of its high frequency of occurrence in instructional programs. The ten phonic generalizations and the synthetic word exemplars are presented in Table 1.

Correct pronunciations of the synthetic word test items were determined by the authors in accordance with phonic rules governing the pronunciation. In addition, faculty and advanced graduate students in the field of reading instruction were asked to pronounce the synthetic words. The most frequent adult pronunciation of each synthetic word agreed with the pronunciation deemed correct by the authors. The appropriate pronunciation of the synthetic words is presented in Table 1.

Each synthetic word test item was typed on a 3 x 5 card using lower case letters and primary type and was presented to each subject in an individual testing situation. The synthetic words were arranged into four blocks such

that within a given block, there was one exemplar for each of the ten phonic generalizations. To control order effects, the synthetic words were randomly arranged within blocks and the order in which the blocks were presented was randomly determined for each subject in the sample.

The subjects' task was to pronounce each word as if it were a real English word. Responses were recorded on tape and were independently transcribed by two linguists trained in phonetic transcription. On the basis of a pilot study, Kuder-Richardson formula 21 reliabilities on the synthetic word pronunciation test were found to be .92, .83, and .65 for second-, third-, and fourth-grade children, respectively.

In addition to the synthetic word pronunciation test, information was sought regarding the children's ability to verbalize appropriately the ten phonic generalizations. Following the administration of the synthetic word pronunciation test, each subject was presented with four synthetic words illustrating a particular generalization and asked (1) if he knew a rule that would help him to pronounce the words and (2) if the spelling pattern of the words gave any indication as to how they were pronounced. Responses of each subject were recorded by the examiner. All data were collected during October, 1971.

Analysis of the Data

The number of children's correct pronunciations of the synthetic word test items constituted the main data for the study. These data were analyzed using a grade by sex by method of instruction analysis of variance technique with method of instruction nested within grades. In addition, correct pronunciations of the specific synthetic word parts described by the respective phonic generalization were tabulated by grade level, instructional group, and

generalization. Children's responses to a rule knowledge inquiry were tabulated and categorized for each grade level and both instructional groups.

Results

The means and standard deviations obtained by the subgroups on the synthetic word pronunciation test are presented in Table 2. The sources of variation and obtained F ratios are reported in Table 3. Differences in mean performance on the synthetic word pronunciation test were found among grade levels ($p < .01$) and between instructional groups at each of the three grade levels ($p < .05$; $p < .01$; and $p < .10$ for grades 2, 3, and 4, respectively). Inspection of the means presented in Table 2 indicated that the mean performance on the synthetic word pronunciation test increased from second to fourth grade and that the mean performance of children in the L group exceeded that of children in the SF group at each of the three grade levels. No significant sex differences or interactions were noted.

In addition to the above analysis, children's pronunciations of specific parts of the synthetic words were tabulated. For this analysis, the specific part of each synthetic word described by its respective phonic generalization was considered. For example, a correct pronunciation for c in the synthetic word cemp was /s/ according to generalization number 3, Table 1. Similarly, the correct pronunciation for a in the synthetic word dape was /e/ according to generalization number 1, Table 1. The number of correct pronunciations for these specific parts of the synthetic words are reported by generalization, grade level, and instructional group in Table 4. It was found that, with the exception of generalizations 3 and 5 at the second-grade level and generalizations 5 and 6 at the fourth-grade level, L group children gave a greater number of correct responses to the synthetic word parts than children in the SF group. Of particular interest was the children's pronunciations of c before e or i in which c represents the /s/ phoneme. Although this generali-

zation has high utility, children tended to pronounce c as /k/ regardless of the subsequent vowel letters. This seemed to be especially true at the second-grade level in both instructional groups. It might be hypothesized that the greater frequency with which c represents the /k/ phoneme in common English words was related to this response bias. A similar response pattern was noted in which the letter g tended to elicit the /g/ phoneme even in cases where the rule would suggest the /dž/ phoneme.

Children's responses to questions designed to examine their ability to state appropriate phonic generalizations were tabulated and categorized as follows:

1. Correct response -- Responses classified in this manner were those which conveyed the essential relationship of the spelling-to-sound pattern under consideration.

2. No response -- This category included non-response as well as the "I don't know" type of response.

3. Analogy response -- Responses of this type were those in which the child suggested that the similarity between the synthetic word(s) and a familiar word(s) provided the clue to pronunciation. For example, gade looks like gate and therefore is pronounced as /ged/.

4. Sound response -- In this category were those responses in which the child suggested that his pronunciation of the synthetic word(s) just "sounded right."

5. Wild response -- Responses of this type were those in which a bizarre rule was given.

The numbers and types of responses are reported by grade level and instructional group in Table 5. These data suggest that children in the two instructional groups were similar in their ability to verbalize appropriate phonic generalizations. For example, in both groups, children were relatively more successful in verbalizing generalizations 1, 2, 7, and 10 than in verbalizing

generalizations 3, 4, 5, 6, 8, and 9. Of the ten generalizations considered, the vowel-consonant-silent e generalization seemed to be known--in the sense of being able to say the rule--by more children in both instructional groups. Between groups, the largest difference appeared to be the greater frequency of the "sound" type of response (number 4) given by children in the SF group as compared with children in the L group. At the second-, third-, and fourth-grade levels, SF children gave 32, 41, and 54 "sound" responses respectively. In the L group, 4, 0, and 1 "sound" responses were given by second, third, and fourth graders, respectively.

Conclusions

Regardless of method of instruction, the ability to pronounce synthetic words in isolation increases with grade level. This finding is in agreement with that of Calfee, et.al., (1969) who also found that mastery of letter-sound correspondences--as measured by the ability to pronounce isolated synthetic words--increased with grade level.

The differences between instructional groups obtained in this investigation suggest that the emphasis given to phonics instruction in the early grades may be an important factor related to the ability of second-, third-, and fourth-grade children to pronounce synthetic words in isolation. If it can be assumed that the ability to pronounce isolated synthetic words is closely related to decoding unfamiliar words, the findings suggest that early, intensive phonics instruction equips the child to become an independent reader at an earlier age. It should be noted, however, that since school systems were confounded with method of instruction, conclusions regarding instructional group differences should be made with caution.

The majority of second-, third-, and fourth-grade children in this investigation were unable to verbalize more than a very few letter-sound generalizations. In both groups, the children were most successful in verbalizing the vowel-consonant-silent e generalization. Although this generalization is of questionable utility, it may be that teachers tend to employ this rule in teaching young children to read, regardless of the method of instruction. However, the data suggest that the ability to say the rules is not an especially useful criterion in determining mastery of basic phonic generalizations. Children in this study differed in their ability to pronounce synthetic words, but were essentially the same in the ability or inability to say the rules. This finding indicates that mastery of letter-sound associations--important in learning to read--may be best observed through application rather than through verbalization of rules. It may be that the critical instructional element is the cluster of factors involved in the structuring of materials such that alphabetic principles are illustrated rather than direct instruction in the rules.

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Table 1

Synthetic Word Exemplars Arranged by Generalization and Block[a]

Generalization	Block 1	Block 2	Block 3	Block 4
1. When a word ends in vowel-consonant-e, the vowel represents its long pronunciation and the e is silent	dape /dep/	kete /kit/	bime /baɪm/	jode /džod/
2. When a vowel is in the middle of a one syllable word, the vowel represents its short pronunciation.	dap /dæp/	ket /kɛt/	bim /bɪm/	jod /džɑd/
3. When c is followed by e or i, it represents the /s/ phoneme	cemp /sɛmp/	roce /ros/	cipe /saɪp/	recilt /rɪsɪlt/
4. When c is followed by o or a, it represents the /k/ phoneme	cobe /kob/	corb /korb/	cade /ked/	carg /karg/
5. When g is followed by e or i, it represents the /dz/ phoneme	geme /džim/	hoge /hodž/	gite /džaɪt/	agime /ədžaɪm/
6. When g is followed by o or a, it represents the /g/ phoneme	gade /ged/	gand /gænd/	gope /gop/	golb /golb/
7. Ch is usually represents the /ts/ phoneme	chal /tšæl/	moch /matš/	chung /tšəŋ/	chait /tšet/
8. When consonant + y are the final letters in a one syllable word the y represents the long pronunciation of i.	fy* /faɪ/	chy /tsaɪ/	jy * /džaɪ/	bly* /blaɪ/
9. When consonant + y are the final letters in a poly-syllable word, the y represents the long pronunciation of e.	niby* /naɪbi/	waby* /webi/	gony* /goni/	necy* /nisi/
10. When ai, ea, ee, or oa is found in a word, usually only the long pronunciation of the first vowel is heard	baig /beg/	peaz /piz/	veeg /vig/	loap /lop/

*Constructed by the authors.

[a]IPA notation from Prator, 1957

Table 2

Means and Standard Deviations on the Synthetic Word Pronunciation Test for Randomly Selected Second, Third, and Fourth Grade Children

	Scott-Foresman		Lippincott	
	Mean	S. D.	Mean	S. D.
Grade 2				
Boys	11.1	9.85	16.5	5.29
Girls	12.2	7.083	18.0	5.79
Grade 3				
Boys	16.3	6.29	23.4	7.76
Girls	16.7	8.47	22.2	4.28
Grade 4				
Boys	18.9	4.954	22.2	8.95
Girls	22.6	5.35	27.1	6.52

Table 3

Analysis of Variance of Scores on the Synthetic Word Pronunciation Test of Randomly Selected Second, Third, and Fourth Grade Children

Source of Variation	df	S.S.	M.S.	F	p
Between Grades	2	1392.07	696.035	14.5261	$p < .01$
Between Methods w/n Grades	3				
Between Methods w/n Grade 2	1	313.60	313.60	6.5447	$.01 < p < .05$
Between Methods w/n Grade 3	1	396.90	396.90	8.2833	$p < .01$
Between Methods w/n Grade 4	1	152.10	152.10	3.1743	$.05 < p < .10$
Between Sexes	1	90.14	90.14	1.8812	$.25 > p > .10$
Grade X Sex	2	113.23	56.615	1.1815	$.50 > p > .25$
Sex X Method w/n Grades	3				
Sex X Method w/n Grade 2	1	0.40	0.40	1.00	-
Sex X Method w/n Grade 3	1	6.40	6.40	1.00	-
Sex X Method w/n Grade 4	1	3.60	3.60	1.00	-
Error	108	5175.00	47.916		
Total	119	7643.44			

Table 4

The Number of Correct Responses to Specific Synthetic Word Parts

Generalization	Exemplars[a]		Grade 2		Grade 3		Grade 4	
			SF	L	SF	L	SF	L
1.	dape kete	bime jode	32 (40%)	62 (78%)	58 (73%)	60 (75%)	58 (73%)	66 (83%)
2.	dap jod	ket bim	48 (60%)	71 (89%)	63 (78%)	68 (85%)	52 (65%)	71 (89%)
3.	cemp roce	cipe recilt	13 (16%)	5 (6%)	26 (33%)	27 (34%)	27 (34%)	36 (45%)
4.	corb cade	cobe carg	63 (78%)	69 (86%)	68 (85%)	77 (96%)	69 (86%)	74 (93%)
5.	geme hoge	gite agime	5 (6%)	3 (4%)	9 (11%)	13 (16%)	19 (24%)	17 (21%)
6.	gade gope	golb gand	72 (90%)	75 (94%)	74 (93%)	79 (99%)	78 (98%)	78 (98%)
7.	chal moch	chung chait	61 (76%)	71 (89%)	67 (84%)	72 (90%)	75 (94%)	79 (99%)
8.	fy jy	chy bly	40 (50%)	47 (59%)	45 (56%)	70 (88%)	59 (74%)	72 (90%)
9.	niby gony	waby necy	39 (49%)	59 (74%)	58 (73%)	75 (94%)	70 (88%)	79 (99%)
10.	baig peaz	veeg loap	43 (54%)	70 (88%)	59 (74%)	66 (83%)	72 (90%)	75 (94%)

[a]Specific synthetic word parts are underlined.

Table 5

Responses to Rules Knowledge Inquiry

Generalization	Category of Response[a]	Scott-Foresman			Lippincott		
		Grade 2	Grade 3	Grade 4	Grade 2	Grade 3	Grade 4
When a word ends in Vowel-consonant-e, the vowel represents its long pronunciation and the e is silent.	1	6	13	14	13	14	17
	2	11	5	0	7	5	3
	3	3	0	4	0	1	0
	4	0	0	0	0	0	0
	5	0	2	2	0	0	0
When a vowel is in the middle of a one syllable word, the vowel represents its short pronunciation.	1	3	10	10	5	8	13
	2	12	7	3	15	11	7
	3	3	0	3	0	0	0
	4	0	0	0	0	0	0
	5	2	3	4	0	1	0
When c is followed by o or a, it represents the /k/ phoneme.	1	0	0	1	0	0	1
	2	13	13	9	20	18	19
	3	0	0	0	0	0	0
	4	6	6	10	0	0	0
	5	1	1	0	0	2	0
When c is followed by e or i, it represents the /s/ phoneme.	1	0	0	0	0	1	2
	2	12	11	4	18	15	17
	3	0	1	4	0	0	0
	4	7	8	9	2	0	1
	5	1	1	3	0	4	0
When g is followed by e or i, it represents the /dž/ phoneme.	1	0	0	0	0	0	1
	2	14	13	9	20	18	19
	3	0	0	0	0	0	0
	4	6	6	9	0	0	0
	5	0	1	2	0	2	0

Table 5 (Con't)

Responses to Rules Knowledge Inquiry

Generalization	Category of Response	Scott-Foresman			Lippincott		
		Grade 2	Grade 3	Grade 4	Grade 2	Grade 3	Grade 4
When g is followed by e or a, it represents the /g/ phoneme.	1	0	0	2	0	0	0
	2	14	13	9	20	18	20
	3	0	0	0	0	0	0
	4	6	6	9	0	0	0
	5	0	1	0	0	2	0
ch usually represents the /tš/ phoneme.	1	4	6	11	6	9	11
	2	14	10	6	13	11	9
	3	0	0	0	0	0	0
	4	2	3	3	1	0	0
	5	0	1	0	0	0	0
When consonant + y are the final letters in a one syllable word, the y represents the long pronunciation of i.	1	0	0	0	0	0	0
	2	13	12	11	19	15	17
	3	1	0	0	0	0	0
	4	2	7	7	0	0	0
	5	4	1	2	1	5	3
When consonant + y are the final letters in a polysyllable word, the y represents the long pronunciation of e.	1	0	0	0	0	0	0
	2	14	14	12	19	20	18
	3	0	0	0	0	0	0
	4	2	5	7	1	0	0
	5	4	1	1	0	0	2

Table 5 (Con't)

Responses to Rules Knowledge Inquiry

Generalization	Category of Response	Scott-Foresman			Lippincott		
		Grade 2	Grade 3	Grade 4	Grade 2	Grade 3	Grade 4
When ai, ea, ee, or oa is found in a word usually only the long pronunciation of the first vowel is heard	1	3	7	9	6	13	10
	2	13	8	3	11	7	9
	3	0	0	0	0	0	0
	4	1	0	0	0	0	0
	5	3	5	8	3	0	1

[a] Categories of response as explained above were:

1. Correct response
2. No response
3. Analogy response
4. 'Sound' response
5. Wild response